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TCS-041

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0149 Roll No.

B. Tech.

(SEM. VIII) EXAMINATION, 2007-08

REAL TIME SYSTEM

Time : 3 Hours] *[Total Marks : 100*

Notes : Attempt **all** questions.

1 Attempt any **four** parts :

(a) Differentiate between soft and hard real time systems with suitable examples.

(b) Differentiate betyween aperiodic and sporadic jobs? Explain the general strategy to handle sporadic jobs.

(c) Explain why predictability is considered as an important requirement of a real time system? How this requirement can be enforced?

(d) What are real time tasks? Distinguish between a Real Time task and a non real time task.

(e) What is an embedded system? Explain with a suitable example.

(f) Define performability with a suitable example.

2 Attempt any **two** parts :

(a) What is rate monotonic (RM) scheduling algorithm? Discuss its assumptions.
If there are two tasks, T_1 and T_2 and

$$\frac{e_1}{p_1} + \frac{e_2}{p_2} \leq 2\left(\sqrt{2} - 1\right)$$

then show that the tasks are RM-schedulable

(b) Differentiate between :
(i) Offline and online scheduling algorithms.
(ii) Feasibility and optimality
(iii) Fixed priority and dynamic priority
(iv) Priority driven and clock driven system
(v) Real time systems and general purpose systems.

(c) Discuss the general structure of cyclic schedules. How is average response time of aperiodic jobs improved?

3 Attempt any **two** parts :

(a) Define Basic Priority - Inheritance protocol and explain its working by taking a suitable example.

(b) Differenciate between the priority Inheritance and priority-ceiling protocols. Explain how deadlock avoidance is done by priority-ceiling protocol.

(c) A system contains the following four periodic tasks. The tasks are scheduled by the rate-monotonic algorithm and the priority ceiling protocol.
T1 = (3, 0.75) b1 = 0.9
T2 = (3.5, 1.5) b2 = 0.75
T3 = (6, 0.6) b3 = 1.0
T4 = (10, 1)
B1 is the blocking time of Ti. Are the tasks schedulable? Explain your answer.

4 Attempt any **two** parts:

(a) Differentiate between

(i) Multiprocessor system and distributed system

(ii) Identical and Heterogeneous processors

(iii) Local and Remote resources

(iv) RMFF and RMST algorithms

(v) Predictability and validation.

(b) Describe Multiprocessor priority ceiling protocol with a suitable example.

(c) Consider a processor Pin an end-to-end system that uses the release-guard protocol in synchronize subtracts on different processors. There are only two subtracts Ti, j = (4,2) and T k,l = (10,4) on P, and they are scheduled rate-monotonically. Moreover, suppose that

(i) Tk, l is the first subtask in the task Tk (i.e. it has no predecessors) and

(ii) The first three synchronization signals from the predecessor of Ti, j come at times 1,2 and 3.

When are the first three jobs in Ti, j released on P ?

5 Attempt any **two** parts :

(a) Explain the VTCSMA algorithm for real-time communication with flowchart and by taking a suitable example.

(b) Differenciate between Real Time operating systems and general purpose operating systems. Explain the working of VRTX real time operating system.

(c) Discuss the various issues that arise in resource reservation. Describe any resource reservation protocol that can deal with these issues.
